consequence of such a conclusion would be that Enderby Land and Kemp's Land, in whose neighbourhood it has already been assumed that no considerable land would be found, would be islands, and that between Kemp's Land and Termination Land chances of penetrating towards the south would be greater than under the meridian of New Zealand.

Dr. Neumayer appends the following sketch of the plan upon which he thinks any South Polar expedition should be conducted:—

1. A wooden sailing-vessel with auxiliary screw of at most 300 tons, thoroughly strengthened at the bow and properly arranged on the upper deck, should be sent out on such an expedition. 2. The ship should be equipped with all the most approved appointments and the most recent and best scientific apparatus suitable for the observation of phenomena of all kinds. 3 Men eminent in each of the principal branches of science should be chosen to accompany the ship, which should first make for the Cape of Good Hope, where all the necessary scientific arrangements and testing of instruments could be made. The Cape, indeed, might be considered as the real starting point of the expedition. 4. For the purpose of regular observations, soundings, and so forth, the expedition should set out about the beginning of the year from the Cape for the various groups of islands visited by Cook and Ross, making for Christmas Haven in Kerguelen, overhauling the observations which have been arranged for now thirty years, and attempting to fix the geographical position of as many points as possible. 5. On the Macdonald Islands, as they stretch farther to the south in this quarter (53° 5·5′ S. lat., 73° 17·2′ E. long.), a depôt should be established, the chief purpose of which should be to maintain an ample stock of coals for the use of the expedition, to convey which from the Cape a transport vessel would be useful. Besides a strongly-built astronomical magnetic observatory should be erected here, which would serve as a basis of observation for the operations of the expedition in the south; for these islands are the outmost fore-posts of the Antarctic regions. 6. The ship could carry on its soundings and researches into the currents, the ocean-bed, &c., with diligence, and go as far south as the season would permit without danger. In December the attempt should be made to cross the polar circle, to force through the girdle of pack-ice, and begin research in the polar regions proper. 7. An attempt should be made, with all energy and circumspection, to winter inside the polar circle, when possibly a suitable harbour might be found on Kemp or Enderby Land. By this means the data for the winter climatology of the Antarctic regions would be ascertained, for which Science has sighed so long. On this position of observation a small contingent of eight or ten men and a whaling-boat should be left, furnished with every means for the preservation of their health and the furthering of scientific knowledge. After establishing this station, the ship itself should return to the Macdonald Islands, and pass the winter, as far as the season will permit, in pursuing scientific labours. 8 By the approach of the favourable season in September and October the work could be again transferred to the sea, and particularly a thorough survey of the Macdonald group should be made. In December the ship would again make for the south, take up the observers on Kemp's Land, and then proceed to further researches until the end of the favourable season urges a return to the Macdonald Islands. 9. At the conclusion of its work the expedition could sail for Melbourne, where the necessary arrangement of the observations could be made. 10. During the sojourn of the expedition in and around the Macdonald group, it might be arranged that a series of Australian-bound ships of all nations should from time to time sail southward and visit the island, which, during the Austral summer would be a matter of little difficulty. In this way a regular connection with Europe would be maintained, and intelligence could, now that we have telegraphic communication between Melbourne and England, reach Europe from the Macdonald Islands in from fourteen to eighteen days. Should the latter group, contrary to all expectation, prove unsuitable to a long stay, then must Christmas Haven in Kerguelen (48° 41′ 1″ S. lat. and 69° 3′ 35″ E. long.) be chosen for the purpose. Should an expedition be fitted out in connection with that for the observation of the Transit of Venus, the above plan would require to be materially modified.

Dr. Neumayer concludes with some sensible remarks on the qualifications necessary to form an efficient leader of an expedition such as he proposes; the man selected for the purpose must be both a seaman and a man of science, and no mere *dilettante* discoverer. Should such an expedition ever be organised, the importance of these considerations cannot be overrated.

FAYRER'S THANATOPHIDIA OF INDIA.

The Thanatophidia of India. Being a description of the Venomous Snakes of the Indian Peninsula, with an account of the Influence of their Poison on Life; and a series of experiments. By J. Fayrer, M.D., &c. 1 vol. folio, coloured plates. (London: Churchill, 1872.)

THIS is a handsome work, got up in good style, printed in large clear type, and illustrated with a number of highly-coloured plates. It is intended to supply a want which the author has often heard expressed—"that of reliable information on the venomous snakes of India."

Dr. Fayrer divides his subject into several sections, the first relating to the zoological and anatomical character of the venomous serpents of India, the others treating of the statistics of deaths caused by their bites, of the mode of treatment of such cases, and of numerous experiments undertaken by the author with a view of ascertaining the influence of snake-poisons, and the value of certain reputed antidotes. On each of these subjects we will make a few remarks.

As regards the more strictly scientific portion of the volume, Dr. Fayrer informs us candidly that we are not to expect anything original. "The classification and definitions are chiefly taken from, or based on, Günther, or other authors of repute, the anatomical descriptions from Owen and Huxley; and to those authorities I make my acknowledgments for much valuable information, remarking, at the same time, that I have carefully verified their descriptions by comparison with, and by dissections of, the snakes themselves." In this passage we think that it is not made sufficiently clear that the whole of the first section of Dr. Fayrer's work is based upon Dr. Günther's

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"Reptiles of British India."—in fact, the classification and descriptions are mostly copied literally therefrom. It is quite true that Dr. Günther's name is frequently introduced, and that frequent passages borrowed from his work are quoted in inverted commas; but, even under these circumstances, we fail to see that Dr. Fayrer is quite justified in appropriating so largely the results of another author's labours to his own use. It would have been easy to state at once that so far as arrangement and classification went, he simply intended to follow those given in "The Reptiles of British India," and to refer his readers to that work for information on these subjects.

In the second section of his work, Dr. Fayrer gives details as to the actual number of deaths caused by snake-bites in India. These statistics were principally obtained from replies to letters on the subject addressed by him to the secretaries and political agents of the several governments. The result arrived at is that the total number of deaths recorded in 1869 in Bengal, the North West Provinces, Oude, and certain other parts of India, embracing altogether a population of about 120,000,000, was 11,416. This total, however, large as it is, Dr. Fayrer fears cannot be regarded as the real mortality in these provinces, the information upon which it is based having been partial and imperfect. Were accurate statistics obtainable from the whole of Hindostan, Dr. Fayrer believes that it would be found that more than 20,000 people die annually in that country from the bites of poisonous snakes. Such being the case, there can be no question as to the importance of the subject discussed in the work before us.

In his third section Dr. Fayrer speaks of the treatment of snake-bite, concerning which, after a certain amount of discussion, he does not appear to have arrived at any very novel results. Ligatures, scarifications, liquor ammoniæ, and hot spirits and water, are the remedies in vogue on such occasions, and to these Dr. Fayrer gives in his adhesion. "The antidotes in addition," he remarks, "may be used by those who have faith in them; but I fear that there is reason to believe that they are of no use." These antidotes, we should have explained, comprehend snake-stones, arsenic, bromine, ipecacuanha, senega, and, "indeed nearly every drug in or out of the pharmacopœia."

Numerous reports of cases of snake-bite by medical officers of the Indian Service constitute the fourth section of Dr. Fayrer's work. These have been selected in order to give a fair idea of the symptoms and of the duration of life after the reception of the bite, and of the pathological appearances after the death of the sufferer.

In the concluding portion of the volume, Dr. Fayrer gives an account of numerous experiments undertaken with a view to ascertain the influence of snake-poison on the lower animals, and the value of certain modes of treatment. These experiments were commenced in October 1867, and continued during a period of three years, the object having been to determine the effect of the bite of venomous serpents by actual observation, and to test the value of supposed remedies both internal and external. The snakes with which the experiments were performed were the Cobra, the *Ophiophagus* or Hamadryad, and the two Indian species of the genus *Bungarlus*, belonging to the Elapidæ, some of the sea-snakes of family Hydrophiidæ, the *Daboia russellii*, and the *Echis carinata*, belonging to the Viperidæ, and one species of *Trimeresurus*, belonging to the Crotalidæ, or Pit vipers. Of these Dr. Fayrer concludes that as regards deadliness the Cobra, *Ophiophagus*, and *Daboia* are very nearly on a par. "They are quite capable of destroying a full-grown dog in half an hour, sometimes in much less time; and frequently," Dr. Fayrer believes, "man has succumbed within an equally short period, though generally the time is much longer." The *Bungarlus cœruleus* is believed to be just as deadly as the above-named, but not to kill quite so quickly. The *Bungarlus fasciatus* is less fatal. The *Echis* is also very deadly, but from its small size less likely to be fatal to man. Of the sea-snakes much less is known, but it appears that human life would be in great danger from their bite. The Elapine snakes of the genus *Callophis* and the Pit-vipers of Hindostan, although capable of giving a painful and even a dangerous bite, are not nearly so deadly.

The symptoms produced by the bite of these different serpents vary slightly, but not so as to present any great physiological or pathological divergences. All alike point to "exhaustion and paralysis of the nerve-centres," every function falling rapidly, and life becoming quickly extinct. "The *post-mortem* appearances frequently reveal nothing except the marks of the fangs, or, if the creature has survived some hours, infiltration and perhaps incipient decomposition of the intestines." Warm-blooded animals are acted upon much more vigorously by snake-poison than cold-blooded animals. As regards the latter, poisonous snakes are not, according to Dr. Fayrer's experience, affected by their own poisons, or by that of one of their own species, although the less-poisonous seem to be subject to the venom of their more poisonous relatives. Lastly, although the blood of an animal killed by snake-poisoning destroys life if injected into another animal, there can be no doubt that the body of such an animal may be eaten with impunity. The fowls and pigeons killed in Dr. Fayrer's experiments were always eaten by the natives without any evil consequences following.

Such are some of the results arrived at from Dr. Fayrer's long and laborious series of experiments. We cannot say that there is any great novelty amongst them. As regards the treatment of snake-bite, indeed, it seems quite conclusively proved that the antidotes, commonly so called, are useless, and that it is hardly probable that any direct specific will ever be discovered. Cure failing, the large mortality now due to snake-bite can, therefore, only be materially diminished by prevention; and the simplest mode of prevention—slow as it may be—is, we think, that recommended by Dr. Fayrer in his circular of January 1870*, *i.e.* to offer small rewards for the destruction of the serpents. The sum expended in this way would, as Dr. Fayrer observes, no doubt be large, but the saving of human life thereby effected would be great.

OUR BOOK SHELF

Forstzoologie. Von Dr. Bernard Altum. I. Saügethiere. (Berlin: Springer, 1872. London: Williams and Norgate.)

DR. BERNARD ALTUM, Professor of Zoology in the Royal Academy of Forestry at Neustadt-Eberswald, gives us, in

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* See page 31 of Dr. Fayrer's work.

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